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ABSTRACT

Various procedures, technologies, and products were developed by the Massachusetts Board of Regents and the Massachusetts Community Colleges in implementing the student followup component of the Vocational Education Data System (VEDS). The Board of Regents took the lead in coordinating the VEDS followup study among the 15 state-supported community colleges. A key feature of the followup study planning sessions was discussion about collecting useful information beyond the minimum required for the VEDS report. An open-book database approach was adopted instead of minimal compliance with federal regulations. An operational analysis of the outcomes from the process included the organizational planning and structure that evolved from the groundwork for this project, the project products such as applications software, and operational difficulties encountered in implementing the project (content validity, confidentiality, and access). Data analyses were conducted at several different levels to produce reports for the federal government, state educational agencies, and the community colleges. (Selected aspects of these analyses are summarized.) (YLB)

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# UTILIZING FEDERAL REPORTING REQUIREMENTS TO GENERATE USEFUL DATA AT THE LOCAL LEVEL: CREATING AN OPEN-BOOK DATA BASE.

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Massachusetts Board of Regents

The Vocational Education Data System (VEDS) is starting to become the major source of information for monitoring the impact of federal funds for vocational education under PL94-482 and for assessing vocational education trends both nationally and at the state level. The present study reports on the procedures, technologies, and products that were developed by the Massachusetts Board of Regents and the Massachusetts Community Colleges in implementing the student follow-up component of the VEDS system. Outcomes are examined in terms of both operational and analytical results and the results that would have been obtained by minimal compliance with federal regulations as compared to the open-book database approach adopted.

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The Vocational Education Data System (VEDS) is starting to become the major source of information for monitoring the impact of federal funds allocated for vocational education under PL94-482 and for assessing vocational education trends both nationally and at the state level. Although the desire for such a data system or information source can be traced back to the Smith Hughes Act of 1916, VEDS did not become a reality to be dealt with until it was mandated as a system in the Vocational Education Reauthorization Act of 1976.

As is reasonably well-known, mandating VEDS as a required state and national level data system did not make the system an operational reality over night. The birthing of the system was far from smooth, as anyone associated with the process will attest to at length. By 1979, the national battle cry was "No VEDS for the Feds" and both Congress and the National Center for Educational Statistics who was charged with administering the system were hip-deep in hearings and testimony of one kind or another.

The reasons for this reaction to the VEDS system are both numerous and complex and warrant investigation in their own right. Some of the reasons for this reaction, however, are relatively easy to identify and exemplary of lessons to be learned.

First and foremost was the breadth and complexity (encyclopedic comprehensiveness) of the VEDS system and the attempts by NCES to bring the system on-line almost all at once. VEDS includes information at the program level on enrollments, personnel, finances, student outcomes and employer satisfaction by targeted populations and legislated categories. The jump to this breadth and level of complexity was simply too great of a quantum leap all at once.

The second major difficulty with the VEDS system was that it was totally silent on the processes and technologies by which the data required was to be produced. It has been maintained that this silence was a purposeful silence for a variety of reasons, but this position only side-steps the fact that the processes and technologies for producing the data did not exist nor had they been thought out in any methodological detail. Further, when this particular problem and the data production assumptions that were implicitly made by designers of VEDS were examined in detail by those who were charged with producing the data, it was found that implementing the types of technologies needed to produce the data meant radically disturbing the data production processes and technologies that were already in place at the institutions affected. The institution, therefore, not only had to create new technology and processes but also had to redo its existing technology and processes. It was in this latter difficulty that the concept of burden came to be more clearly defined.

The third major difficulty with the VEDS system was that the data it produced was only minimally useful to the institution who was bearing the burden of data production. The reasons for this difficulty are again numerous and complex, but can be reduced to institutions being as interested in the "why" as the "what" of educational outcomes.

The fourth major difficulty with the VEDS system was that it was a closed rather than open-book data system. VEDS is not particularly unique in this respect as almost all educational databases at the macro level are currently closed-book systems.

What is an open-book system? The open-book concept says that those who produce the data and those who are affected by the data and the decisions made from it must have access to the data, participate in the establishment of the database itself, and be able to analyze the data for themselves, not just for their own uses and purposes, but also to prove to themselves the correctness of the analyses of others, or defeat these analyses empirically.

Are closed-book databases a problem? Ask anyone in higher education about the Halstaad or Chambers reports or several other such reports, and you will not have to talk very much for the next few hours. VEDS, historically, was a late entry into a rapidly increasing population of closed-book databases, and this fact did not help this data system relative to getting a fair and objective examination by many of the constituencies it impacted. NCES, fortunately, began to recognize many of these problems early in 1980.

All of the above difficulties with VEDS affected community colleges more severely than secondary schools. Beginning in 1980, therefore, NCES began meeting with a National Committee of Community College representatives to see what could be done to remedy the problems with VEDS for community colleges. This committee met regularly for over a year and completely revamped the VEDS system to make it simpler, operationally implementable, and more useful at the local level.

Despite this cooperative work between NCES and the community college committee, the student follow-up component of the VEDS system remained problematic in a variety of ways but particularly relative to the processes and technology by which the data were to be produced and the usefulness of the data to

local institutions. Somewhat ironically, NCES, after initial reactions to the other components of the system, reduced the follow-up component of the system to 10 federally required items and 5 reports which severely reduced the utility and interpretability of the follow-up data even at the national level. Somewhat ironically again, much of the Community Colleges' Committee's work on the follow-up component was focused on expanding the follow-up component of the VEDS system so that it would produce more useful and interpretable data at both the local and national level. In the end, however, it was the reduced version of the VEDS follow-up component that prevailed with all of its incipient difficulies and problems.

VEDS Follow-up

The purpose of this paper is to report the procedures, technologies, and products that were developed by the Massachusetts Board of Regents and the Massachusetts community colleges in implementing and conducting VEDS follow-up. These procedures, technologies, and products are generic and utilizable by other institutions and states and are somewhat exemplary in terms of what can happen when federal, state, and local professionals focus on working cooperatively to solve problems and achieve goals rather than upon solely getting their own individual needs met. Lastly, the results of the system-wide follow-up study conducted will be reported so that these results will not only be available to others but also so that they may be compared and contrasted with the results that would have been obtained if the path of minimum compliance with federal regulations had been chosen rather than the path described below.

Follow-up Studies

Follow-up studies can be an important source of information to assess the impact of an educational program or set of programs. Further, data generated from follow-up studies can also be used as input for institutional and systems planning. The problems associated with conducting follow-up studies, however, are not only numerous and complex but also compounded when one leaves the context of an individual institution and attempts to focus on sets of institutions.

Forgetting their methodological short-comings, institutional follow-up studies tend to be very idiosyncratic which creates both comparability and interpretability problems not only between institutions but also for the same institution over time. This fact is coupled with an irony which is that institutions need the data from other institutions to make their data highly useful and interpretable. This irony leads to further problems of expense, coordination, cooperation, and needed technologies. The scale of these problems and the expense, however, is what keep institutions apart and operating idiosyncratically. A mandate requirement, therefore, is an external pressure that can act to overcome various impediments to systems development, particularly when there is a loss of funding associated with failing to satisfy the requirements. However, a mandate alone, it should be clearly noted, will not achieve the desired results and will in fact fail, as the history of VEDS has quite clearly shown.

It was pressure from the VEDS requirements that pushed Massachusetts Community Colleges as a group to the concept of regular rather than "one shot" follow-up studies. It was also the pressure of the VEDS requirements that made the colleges seriously consider standardizing their follow-up studies so that the data generated from the effort would have greater

utility and benefit for the cost and effort invested.

Preliminary analyses of the problem indicated, however, that minimal compliance with the mandated VEDS follow-up requirements would not achieve the colleges' desired goals. The basic problem with the minimum VEDS requirements is that the minimum requirements produce a very limited data set of relatively low usability due to a lack of appropriate control variables and other information sets that are considered to be important by community colleges.

The response of the Massachusetts Community Colleges to these various problems was to form a committee that would devise a follow-up form, model, and process that would not only remedy these shortcomings, but which also would satisfy the federal requirements in an efficient and cost-effective manner. Support for this committee and its work was obtained from both state officials and NCES. The Massachusetts Department of Occupational Education provided some cost-sharing seed funds to bring the project to completion, as the Department of Occupational Education and not the Massachusetts Board of Regents is the sole state agency for vocational education in Massachusetts. It should also be pointed out that although there was some conflict between these various agencies, all of these agencies strongly supported this project and its goals. This latter fact cannot be stressed too strongly, moreover, as it was critical to the success of this project.

## FOLLOW-UP PLANNING

As the agency designated by the state legislature to oversee the operation of all colleges and universities within Massachusetts, the Masschusetts Board of Regents took the lead in coordinating the VEDS follow-up study among the fifteen state-supported community colleges. A staff member of

each community college was designated as the college's VEDS Coordinator. These coordinators met with staff from the Board of Regents to plan the follow-up study and in particular to develop the content of the follow-up survey, which incorporated both federally required and localy desired information in one instrument. These coordinators also oversaw both the mailing of surveys to 1981 graduates and the preparation of a "student background" tape which was incorporated into the database during the data analysis phase of the project.

A key feature of the follow-up study planning sessions was the discussion among the VEDS coordinators and Board of Regents staff about collecting information beyond the minimum required for the VEDS report which would be useful to the individual colleges and the Board of Regents. These discussions formed the basis for generating survey items and for identifying data which was critical and could be supplied by the college. The basic requirement for including particular items in the survey form was that the form be kept short, (i.e., no more than one page both sides) and that the response to the item would provide information useful to a majority of the community colleges and/or the Board of Regents. Some of the additional items on the questionnaire concerned prior work experience, co-op education and other work experience during enrollment, achievement, age, mode of program completion, and transfer to other colleges, as a central objective of the project was to generate models which would causally describe short-term program outcomes. In the end, the survey form contained 30 items with an additional 6 items provided by computer tapes.

All of the schools agreed to send out the same form of the survey within a one month interval, (February 1 to March 1, 1983). A cover letter describing the survey and a prestamped

return envelope were included with the questionnaire. The cover letter was signed by the President of the college that each student attended. The completed surveys were mailed directly to the Board of Regents rather than to the individual colleges and the reasons for this mode of survey return was explained in the cover letter that was sent to the student. A total of 4,936 surveys were mailed to students who graduated from Career Programs conducted at Massachusetts Community Colleges in 1981. These 4,936 students were the universe of graduates from these programs.

By having the completed surveys returned directly to the Board of Regents it was possible to ensure data integrity by establishing standardized coding procedures across the fifteen community colleges, and to maintain unit record data (i.e. individual survey responses), rather than aggregate data only (i.e., totals by college), for use in data analysis. Furthermore, since the Board of Regents served as the central data analysis point, it was economically feasible to prepare software tailored specifically to the VEDS reporting requirements and local institutional reporting.

Lastly, we did not do leaver follow-up nor employer follow-up as the States were exempted from these requirements for 1981 graduates.

Results

The outcomes from this project can be examined at two different levels: operational analysis and data analysis. The operational analysis includes the organizational planning and structure which evolved from the groundwork for this project,

the project products such as applications software, and operational difficulties encountered in implementing the project. With regard to data analyses, project efforts have been geared to producing reports for the Federal government, state educational agencies and the 15 state-supported community colleges. A brief overview of the analyses included in these reports will be presented at the end of this paper.

Operational Analyses

While the central purpose of the follow-up project was to produce summary reports which would meet NCES requirements, this objective was embedded within two other objectives. The first of these two objectives was to develop a database and a data retrieval system which would enable diverse users to utilize the follow-up data for their own needs and the second objective was to create a cohesive planning network which encompasses the Board of Regents, the 15 community colleges, and other state and federal agencies.

Given the need to balance the three objectives described above, careful "front-end" planning was essential. The "front-end" planning required, moreover, involved far more than just the design of the questionnaire and identification of the follow-up sample.

Prior to data collection, detailed data coding procedures were established, and basic data processing needs vis-a-vis software development, computer time, and programmer time were identified. This detailed planning allowed us to allocate funds and staff for the project in an efficient manner. More importantly, this advanced planning made it possible to avoid

many design errors and to minimize the consequences of potential project difficulties and failures.

A flow chart of basic project activities is presented in Figures 1 and 2 which are included at the end of this paper. An examination of the flowcharts will reveal that staffing needs vary during the course of the project. In general, project staff are responsible for five major tasks: a) overall design and management of the project; b) coding of incoming surveys; c) data entry; d) software development; and e) data analyses. During the early phases of the project the primary staff needs are for survey coders, keypunchers, and programmers but as the project progresses the need for coders and keypunchers decreases while the need for research analysts increases dramatically.

The flow chart in Figure 2, it should be noted, also contains "Hold" locations. These "Hold" locations are potential trouble spots which were identified prior to the start of data collection. By identifying these and other potential trouble spots it was possible to not only develop contingency plans but in some cases to dovetail contingency plans with the basic project plan in ways that could enhance the project at minimal cost or effort. In general, such planning is often referred to as parallel or simultaneous planning rather than serial or linear planning. Parallel planning was an important factor in the success of the project.

A prime example of parallel planning in this project was our request for student information on computer tapes. The purpose of these computer tapes were (a) to fill in missing information (e.g. ethnic background) on returned surveys to make them usable for VEDS reports and (b) to gain associated control variable information for building a fuller data model

than was generated or could be generated from the survey instrument alone. The computer tapes, therefore, were a back-up mechanism for surveys returned with missing data on key items and a method of accessing data that could not be readily obtained through the survey instrument itself. These computer tapes, however, also served as a back-up in another important way.

Since this follow-up project was the first statewide survey of community college graduates, we had no way of estimating valid survey return rates. Consequently, we decided to build in a plan for a second mailing in case the initial rate of returns was too low to produce meaningful results. While there are numerous ways to conduct a second mailing, we decided to code identifying information from the survey forms and to cross match the returned surveys with an original list of the universe. Address labels for a second mailing could then be generated from the remaining non-matches from the universe lists.

Each community college sent a computerized list of the graduates' names, coded student identification numbers and home addresses. For those colleges which had computerized their student records there was little additional cost to adding information such as GPA or date of initial registration to their master list of the graduates' addresses, and each piece of information each college added to the tape increased the potential power of the study. Therefore, sound front-end planning enabled us to obtain additional student data which could be used during the analysis phase, even if it was not necessary to conduct a second mailing.

Another example of the use of parallel planning was in the software development component of the project. One objective of the project was to develop an integrated set of applications software which could be used to produce accurate and appropriately formatted reports for NCES directly from the raw survey data. Software development, therefore, was built into the project plan in several different places (see Figures 1 and 2). However, an alternative fallback route was also pursued. This fallback route was to use existing software packages (i.e., SPSS and Infofetch) to produce reports in a piecemeal fashion to complete the NCES report.

Once again, parallel planning was not a wasted effort, since the results from the analyses from the prepackaged programs were used to verify the accuracy of the project-developed integrated software. Such cross-checking is not only standard operating procedure in software development, but is also the concept of concurrent validity in another form. Further, with minor modifications the prepackaged software programs were used for more sophisticated data analyses in the reports for the Regents, the Department of Occupational Education and local colleges. Once again, therefore, detailed and careful preplanning enabled project staff to dovetail safety-net procedures with ongoing project needs at little or no cost to the project.

Software Development

In many educational research projects software development does not begin until the data have been collected and keypunched. In contrast to the typical project, a computer programmer was added to the staff prior to the coding and

keypunching of the follow-up data. Discussions between the programmer and other project staff were very important in determining how to code and keypunch the survey in the most efficient manner.

For example, wage data had to be reported in terms of salary per hour not including overtime. The wage related items on the survey allowed respondents to report their salary in terms of salary per hour, per week, per month, or per year. Not surprisingly respondents invented many other ways of reporting their salary, namely, per day, per two week interval, per job completed, per sale, and so on. The programmer pointed out that while software could be developed to handle just about any form of wage data input, given the wide variety and in some cases idiosyncratic wage responses it would be most efficient to convert the reported wage into an hourly wage right at the time of coding the surveys. On the other hand some seemingly simple coding tasks could be handled most efficiently through the applications software.

Another example of this point of including a programmer on the team early on in the project concerns the problem of identifying valid VEDS surveys. According to NCES reporting requirements, the only surveys which could be included in the database for VEDS reporting were those which were complete in terms of certain key items defined by NCES in their specifications of the VEDS follow-up system. However, since the key item set for determining a valid survey differed depending on the respondent's employment status, separating valid from invalid surveys was a difficult and complex problem. In this instance the programmer indicated that it would not be difficult to incorporate a generic selection criteria module into the applications software. By working in

tandem, therefore, project staff were able to optimize the survey coding and software production components of the project.

Data Structures

Given the above discussion about having a programmer interact with the research and development staff in the early phases of design, three key points need to be made. First, interaction with a programmer during the early phase of the project was only possible because the project staff adopted a data structures orientation at the outset of the project. The survey was not simply a list of items, it was a structured set of items with the structure being known and depicted explicitly in terms of its many different aspects and features. This explicit and detailed structure down to codes and file structures is what made the range of products developed, analyses conducted and productive interactions with the programmer possible.

The second point of importance is that the explicit data structures approach enabled and brought about various evaluations and analyses of the survey itself relative to the detection of flaws and weaknesses prior to the survey being finalized. The data structures approach, therefore, is also a methodology of product evaluation as well as product design.

The third point of importance is that an explicit data structures approach makes the instrument and study design itself highly transparent, as it did to the programmer who came to work with the research and development staff. Explicit structures and structuring, therefore, is both a necessary and critical feature of the open-book database concept.

Database Design

As previously mentioned, the reporting requirements for VEDS could have been met without developing an integrated set of applications software. In contrast to the one-time data needs of the NCES, however, the open-book database concept required that the survey data be entered into the database at the level of the unit-record and conversely to be accessible from the database on a unit-record basis.

Instead of first producing the VEDS reports and then trying to create an open-book database system, it was most efficient to allocate funds right at the start of the project to developing the open-book database system in tandem with the VEDS reports. In the short run, incorporating the open-book concept right from the beginning required greater immediate expenditures and effort, but over the life of the data (not just the project) the costs for the open-book system will prove to be much less expensive on about a $5 to $1 basis. Start-up costs are relatively high in an open-book database system, but maintenance costs are very low and almost constant. When one factors in the power and quality of the data one has, however, versus the data one would have had by choosing the minimum response route, the cost/benefit ratio difference between the two alternatives is a very large number. Some critics, moreover, have argued that the cost/benefit ratio for the minimum response route is a negative number, particularly at the local level.

One of the ironies of the VEDS system is that it is implicitly unit-record driven on the front-end (i.e., the enrollment components) and table-driven on the back-end (i.e., the follow-up components). It is our belief and contention that the exact opposite design is needed for a minimal

system, as the follow-up components are final in character, more difficult to do operationally and more difficult to analyze and interpret. Obviously, a unit-record system would be desirable throughout, but if one had to choose a table-driven front-end and a unit-record driven back-end would be the better choice, as we believe the analyses presented at the end of this paper will show.

Computer Tapes

Prior to this follow-up project the community colleges had never submitted information to the Regents or any other agency we know of in a computer accessible format. The Regents staff, therefore, were somewhat unsure about the colleges' capability to provide the requested data according to specifications within the designated time-frame. As it turned out, these apprehensions were well-founded.

Although very detailed tape descriptions, formats and standards were provided to the colleges, numerous problems were encountered with the computer tapes the colleges produced. The most common problem was the college's D.P. staff not following the tape descriptions, formats, and standards distributed and not providing the Regents staff with any documentation on how their tape differed from the tape requested and the standards distributed.

Another problem with the background tapes concerned the accuracy and completeness of the data. Only two community colleges provided us with all of the information which we requested and there were a few colleges which were unable to provide us with anything more than the information necessary to produce a mailing label. This empirical result deviated

markedly from what we were told could be produced by managers and coordinators, and it is a fact that should be well noted.

The reasons for the above results are somewhat complex and historical, but there is one point that is well worth noting. Unlike the programmer who did the VEDS and project programming, we did not include the DP Directors directly in the front-end phases of the project. This lack of inclusion was in part due to various expediencies associated with the time constraints imposed on the project in terms of reporting deadlines. It was, however, a mistake and one we are seeking to remedy in a variety of ways not only in terms of this project but also on a system-wide basis. In the end, each college did manage to produce a machine readable tape with at least mailing labels on the tape and we considered this outcome to be a major achievement in the piloting of this process.

Content Validity

The issue of the accuracy of the database has already been discussed but the issue of the validity of the database has only been discussed at the level of producing VEDS reports. As previously mentioned, selecting valid cases for VEDS reporting was a difficult and complex problem due to the key item set varying depending on the respondent's status on different items. Another validity problem, however, was encountered in the process of developing the full software system and this was a difficult problem that we did not anticipate.

This second validity problem was that a survey which was apparently valid for the community college system as a whole was not always valid at the level of the individual community

college. To be more specific, graduates in the VEDS data stream are classified according to a 6 digit Office of Education program code, (e.g., 14.0008 for secreterial science). The integrated software for the VEDS reports was designed to eliminate any survey records with invalid program code numbers for the community college system as a whole based on Board of Regents approved degree programs. Given this point then, college A may logically have graduates from code 14.008 while college B may not because college B does not have this program, as no such program has been approved for the college by the Board.

Now, for the production of the VEDS reports a return from a graduate of college B with the program code 14.008 would have been considered a valid survey since that code number was included in the universe of degree programs reported previously to NCES in the Graduates/Leavers Report filed by the State. However, when we began to produce individual college reports, we found situations where there were surveys being returned from students who graduated from supposedly non-existent programs for particular colleges.

This result obviously caused problems with the reports and the software and on several other factors as well. A variety of "reconciliation" modules, therefore, had to be added to the software (and elsewhere) to remedy this problem. Here again, many of the discrepancies were explicable and technically reconcilable but extremely tedious and time consuming in their resolution.

Given the above points, our design error was focusing on the validity of the database on two levels only; namely, individual students and the total universe of programs. We did not sufficiently attend to validity issues at a third level;

namely, that of the individual colleges themselves. This intervening variable (namely, the individual colleges themselves) is a difficult one to deal with at every level in the process from design to the analysis of the data. Nevertheless, maintaining data at the individual response level enabled us to rectify the problem fairly easily once it was discovered and we are now building this control feature into the system.

Confidentiality

The process of making the data available to users beyond the Regents staff and participating colleges is now beginning to confront us, as the power of the project and the data it generated begins to take hold. One problem associated with the creation of an open-book database is ensuring confidentiality. In general, absolute confidentiality is impossible whenever any identifying information is available. Therefore, while it would be impossible to identify an individual graduate directly from our data base, an individual who had access to a list of graduates from a particular college which included degree program, sex, age, ethnic status, and special needs, could with the aid of a computer identify some of the individuals in the database, if only probabilistically. Obviously, the only person in the world who would go to such lengtns to identify graduates in this manner would be the college's Alumnae Giving Director. However, since mass mailing would be a far more cost-efficient strategy, we doubt that even the Director of Alumnae Giving would go to such lengths to identify particular individuals.

Since there is actually very little data in our follow-up survey that is truly confidential, the confidentiality issue is

a somewhat moot one in this case. However, the confidentiality of the data needs to be insured, and can be insured, and the reader is referred to several publications for descriptions of the technologies that are available to achieve such protections (e.g., Boruch, 1972, Helman, 1979, Carifio and Biron, 1979).

Access

An open-book database requires special efforts to ensure respondent confidentiality. However, special efforts are also required to ensure user accessibility. Providing detailed documentation and accessibility to the database and available software is essential for a viable open-book database system. Developing adequate documentation, however, takes a considerable amount of time, particularly if one is trying to make the database available to individuals who may not be sophisticated computer users. Providing training in ways to access and use the existing database and software is also a required component of a complete open-book system, even with sophisticated users. Lastly, there are a number of convenience items that need to be developed which help users in a variety of ways and these convenience items will be described more fully in the next section of this paper.

Open-Book Database Products Developed

Five major database products were developed in carrying out this project. To meet the primary objectives of the project, a set of integrated software applications packages were developed to produce the required VEDS reports. Samples of the computer printouts that were generated for the VEDS reports are presented at the end of this paper. Once the data has been keypunched, entered into the computer and reformatted, the

entire five part report can be generated with a one line command from an interactive computer terminal.

In addition to the overall VEDS report, each community college was sent similar reports which were limited to the graduates from their particular college. These customised reports allowed the colleges to compare their graduates with the overall statewide totals on a program by program basis. Alternative formats for summarizing the data were also used to provide each individual community college with readily usable information. For example, wage data in the VEDS report was reported only for those graduates who were working full time in a field related to their training. We prepared college by college wage data for graduates employed both full time and part-time in their field of training and a similar breakdown for graduates who had jobs in fields not directly related to their training. An excerpt of one of these community college printouts is presented at the end of this paper.

Another project product was a floppy diskette which contained all of the project's and database's documentation and all the data analyses which were included in the reports generated for the state level agencies. In this way, all of the documentation and the data analyses could be made readily available to anyone with the appropriate hardware. In our case the diskettes were generated for a Wang word processing system.

Since each of our community colleges has their own Wang system, these diskettes allowed us to disseminate results quickly, and to put the results on a look-up basis at each college. In addition to being able to view the data on diskettes, the diskettes were prepared in word processing

format so individual schools could create typed copies of any table whenever it was needed. These same points also held for the project's and the database's documentation. Not only a great deal of paper was eliminated in this way, but also a great deal of hunting through hard copy files by people searching for information.

Three other products have also been developed in order to maximize the utilizability of the raw data collected for this project. On-line accessibility to the raw data and the analytical software have been provided to each of the community colleges. At the unit record level, all identifying information has been deleted but a user can still analyse the data in a myriad of ways. In addition to the raw data, open-ended statistical analysis and report generator software (SPSS and Infofetch files) are also available to any user of the data and not just our 15 community college users.

We have already had requests for access to our data by two doctoral students at local universities and we are currently working out access agreements with both of these doctoral students. As we are replicating and expanding our efforts, we believe that our database will become more and more interesting with time to a wide variety of people. Finally, documentation in both hard copy and diskette form is available so that the project itself can be replicated and interested users can access existing data for their own research or program planning needs. All of the VEDS reporting software programs are, moreover, in COBOL which makes them reasonably transportable to a variety of machines.

Data Analyses

As previously mentioned, the data analyses for this project were conducted at several different levels. Selected aspects of these analyses will be summarized below, as a full reporting of results is simply beyond the scope of the present paper.

Of the 4,936 1981 Career Program graduates, 1,367 (28%) returned surveys which were valid in terms of the VEDS reporting requirements[1]. Overall, only 54 (4.9%) of the 1367 graduates who responded to the surveys were unemployed and not attending school, in the military, or not in the labor force. This result is far below the State (7.9%) and the national (10.1%) averages for rate of unemployment at the time the survey was conducted.

In terms of the remaining responders, 897 (65.6%) were employed in a field related to their training, 137 (10.2%) were employed in a field not related to their training, 243 (17.7%) were pursuing additional education, 32 (2.5%) were not in the labor force (e.g., stay-at-home spouses), and one was in full-time military service. When the data were analyzed to include students who were employed full-time and going to school, 506 (37%) of the graduates who responded to the survey were pursuing additional education.

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[1] In total there were 1,652 surveys returned which constituted 33.5% for the career program graduates from the community colleges. A 17.2% loss rate, therefore, occurred in terms of surveys that did not meet NCES validity requirements. The analyses presented here have been confined to VEDS valid surveys. A second mailing was not done due to the response rates obtained and the constraints of reporting deadlines.

Among those students who were logically eligible for full-time employment, 897 (70.2%) were employed in a job directly related to their training. The bulk (65%) of the 137 graduates who were employed in fields not related to their training were from Police and Fire Science Programs and administrative and secreterial programs. This latter outcome seemed to be logical in terms of both Massachusetts' Proposition 2-1/2 which limited local taxes and the state's overall economy which was in a business down turn at the time of this survey.

Finally, for those graduates who were employed in their field of training, the average hourly wage for males was $8.53 per hour, while the average hourly wage for females was $6.88. The average wage ranged from $3.93 per hour to $14.00 per hour. These average hourly wage statistics are significantly above the averages for the state.

These results in terms of unemployment levels, levels of employment in fields related to training and average hourly rate are excellent, particularly since they are averages across roughly 45 different degree programs conducted at 15 colleges spread across the state. The problem with these findings, however, is that we do not know whether the results would be this good if the missing 72% of the graduates (i.e., the non-responders) were included in the database, and this is why we are proceeding very cautiously with these findings at this point in time. Further, the results that were observed for the Police and Fire Science Programs and the administrative and secretarial programs clearly indicate that there are some significant interactions in the data that must be considered in the interpretation of outcomes. We have explored some of these interactions and they clearly indicate that one must be very careful in interpreting the data in several different ways.

At the macro level (all graduates and all programs), the rank order of step-wise multiple regression effects were Age, Generic Program Area, Sex, College Location (Urban versus Rural), and Graduates Rating of Quality of Job Preparation. The significance of these variables decrease in rank order by about half beginning with Age which had an F-ratio of 77.6. The interactions of these five variables account for about 24% of the variance observed in hourly wage, degree of job relatedness to training, rating of the quality of job preparation, the pursuit of additional education and a number of other variables. Some of the basic reasons for these effects can be seen from Table 1 which presents age distributions by macro program areas.

As can be seen from Table 1, graduates are not distributed evenly across macro program areas. Graduates are concentrated in the Business/Secreterial (42%), Health (28%), and Technologies (21%) areas. More significant, however, is the fact that age of graduates is both distributed and concentrated at the same time.

As can be seen from Table 1, community college career program graduates range in ages from 20 to over 56 years old. Over 35% of the career program graduates in the sample were over 28 years old at the time the survey data were collected. The majority of older students (37 or greater), however, are concentrated in the Health and Technology areas. Similar distributions and concentrations, moreover, were also found for sex and prior work experience. The nature of the macro interactions found in the data, therefore, were nested step-wise within factors.

In general, older men and women (37 or greater) were more concentrated in Health and Technology programs than they were

Table 1

AGE GROUP BY DEGREE PROGRAM AREA

| Age Group | Degree Program | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Agriculture | Service Indus | Medical Health | Child Care/ Food Services | Secretary Business | Technology | Production/ Other | Total |
| 22 and younger | 3 | 22 | 67 | 14 | 205 | 55 | 5 | 371 |
| | 1% | 6% | 19% | 4% | 54% | 15% | 2% | 28% |
| | 21% | 56% | 22% | 30% | 40% | 23% | 29% | |
| 23 to 27 | 5 | 13 | 101 | 21 | 181 | 113 | 7 | 441 |
| | 1% | 3% | 23% | 5% | 41% | 26% | 2% | 34% |
| | 36% | 32% | 27% | 43% | 33% | 42% | 41% | |
| 28 to 33 | 3 | 5 | 93 | 5 | 69 | 38 | 2 | 215 |
| | 1% | 2% | 43% | 2% | 32% | 18% | 1% | 16% |
| | 21% | 12% | 25% | 10% | 13% | 14% | 12% | |
| 34 to 39 | 1 | 0 | 55 | 2 | 39 | 32 | 3 | 132 |
| | 1% | 0% | 42% | 2% | 30% | 24% | 2% | 10% |
| | 7% | 0% | 15% | 4% | 7% | 12% | 18% | |
| 40 to 45 | 1 | 0 | 25 | 2 | 26 | 18 | 0 | 72 |
| | 1% | 0% | 35% | 3% | 36% | 25% | 0% | 5% |
| | 7% | 0% | 7% | 4% | 5% | 7% | 0% | |
| 46 to 55 | 1 | 1 | 26 | 3 | 21 | 12 | 0 | 64 |
| | 2% | 2% | 41% | 5% | 33% | 19% | 0% | 5% |
| | 7% | 2% | 7% | 6% | 4% | 4% | 0% | |
| 56+ | 0 | 0 | 3 | 2 | 5 | 4 | 0 | 14 |
| | 0% | 0% | 21% | 14% | 36% | 29% | 0% | 1% |
| | 0% | 0% | 1% | 4% | 1% | 2% | 0% | |
| Total | 14 | 43 | 386 | 50 | 572 | 282 | 20 | 1309 |
| | 1% | 3% | 28% | 4% | 42% | 21% | 2% | |

Table 2

**AGE GROUP BY GRADUATE'S SEX**

| Age Group | Sex | | |
|---|---|---|---|
| | Female | Male | Totals |
| 22 and younger | 309<br>83%<br>33% | 62<br>17%<br>16% | 371<br>28% |
| 23 to 27 | 277<br>63%<br>30% | 164<br>37%<br>43% | 441<br>34% |
| 28 to 33 | 134<br>62%<br>15% | 81<br>38%<br>21% | 215<br>16% |
| 34 to 39 | 91<br>69%<br>10% | 41<br>31%<br>11% | 132<br>10% |
| 40 to 45 | 53<br>74%<br>6% | 19<br>26%<br>5% | 72<br>6% |
| 46 to 55 | 52<br>81%<br>6% | 12<br>19%<br>3% | 64<br>5% |
| 56+ | 9<br>64%<br>1% | 5<br>36%<br>1% | 14<br>1% |
| Total | 965<br>71% | 402<br>29% | 1367 |

Table 3

GRADUATE'S SEX BY DEGREE PROGRAM AREA

| Sex | Degree Program | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Agriculture | Service Industry | Medical Health | Child Care/ Food Services | Secretary Business | Technology | Production/ Other | Total |
| Female | 10 | 27 | 349 | 47 | 441 | 80 | 11 | 965 |
| | 1% | 3% | 36% | 5% | 46% | 8% | 1% | 71% |
| | 71% | 63% | 90% | 94% | 77% | 28% | 55% | |
| Male | 4 | 16 | 37 | 3 | 131 | 202 | 9 | 402 |
| | 1% | 4% | 9% | 1% | 33% | 50% | 2% | 29% |
| | 29% | 37% | 10% | 6% | 23% | 72% | 45% | |
| Total | 14 | 43 | 386 | 50 | 572 | 282 | 20 | 1367 |
| | 1% | 3% | 28% | 4% | 42% | 21% | 2% | |

in other programs. Younger women (less than 23) were more concentrated in Business and Service programs. In general, salaries were higher in Health and Technology programs and higher in urban rather than rural areas. Employment in a training related area was greater in the Health and Technology field and greater in urban rather than rural areas, particularly for older graduates. Neglecting Police and Fire Science graduates, young women in non-health and non-technical fields were employed mostly in jobs unrelated to their training at comparatively lower wages. These women also tended to be pursuing additional part-time education.

Over 80% of the community college graduates had work experience prior to entering their program, with about 62% of the graduates having had prior work experience in their current area of training. Over 70% of the graduates worked while attending their program in some form. Neither prior work experience nor working during training, however, directly predicted employment status, hourly wage, degree of job relatedness or other factors in step-wise multiple regressions when the basic macro factors of Age, Sex, and macro Program Area were included in the equations. The work experience variables, therefore, were primarily statistical surrogates for Age, Sex, and Macro Program Area which are themselves statistical surrogates for other complexes of variables. Nevertheless, it is quite clear from the analyses conducted that the 1981 graduate population was quite heterogeneous in character with at least three significant subpopulations embedded within it. Further, it was also quite clear from the analyses conducted that many of the systems programs were being utilized for upward mobility and career shifting purposes.

What one sees from these results is that both macro and micro program outcomes are a function of several complex

processes and that uncontrolled comparisons between programs (and/or colleges) and outcomes would most likely be quite spurious. A number of potential differences between populations, programs, and colleges must be taken into account in assessing and interpreting all outcomes, as our macro analyses indicate[1].

We fully recognize that our macro models are currently exploratory and extremely broad-guaged, particularly in terms of college, person, and program characteristics. We are also quite aware that our macro analyses indicate that micro models of the data need to be developed which analyze the data separately by sex, age group, program area, location and several other factors. Further, we recognize that micro models of the data may be more highly informative, particularly to individual colleges in terms of examining the constellation of programs they offer in terms of the various macro factors that we have identified. We are presently moving in these analytical directions and our planned replication of this study within 1982 graduates should help us considerably in these various analytical activities.

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[1] Preliminary analyses indicated that older graduates tended to return the survey, whereas younger graduates did not. This return rate bias accounts for the size of some of the percentages of totals on certain variables but does not significantly impact the basic nature of the structural findings. In the worst of all possible cases, the age findings would only be diminished somewhat in magnitude if the entire population returned the survey. Given the size of the effects, age would still be the first variable stepped out in the regressions and it would still be the most powerful predictor by at least two orders of magnitude.

## Conclusions

Obviously, there are a plethora of conclusions that may be drawn from our project at a variety of different levels. Although many of these conclusions are rather ironical, we would like to focus on those that may not at first be apparent to readers unfamiliar with this area.

First, the Vocational Education Data System (VEDS) was an historical event of great importance that should be carefully studied in a variety of ways for what it can teach us about macro data systems. The VEDS participants have the historiographical data that is needed for clarifying critical concepts, values and issues in this area. It is vital, moreover, that such clarification processes occur, so that we can move to newer levels of conceptualization and understanding in a reasonably short period of time. Many facets of the problems in this area have been chronically persistent for over 70 years.

The next point of importance is that there is a tremendous amount of human systems building and technical work that must be done and in place prior to initiating a project like the one reported on here. One should not even attempt this kind of project, moreover, without this necessary predevelopment. In one form or another, preparation for this project was done in fits and starts over a three year period, and it was the end of the 5 year authorization period of PL94-482 and the need for compliance for reauthorization that brought this project to fruition in a rapid time frame. If we had not done the predevelopment work, and if there had not been an incipient system in place, we would not have been as successful as we were.

The next point of importance concerns our choice of the non-minimum compliance route in responding to the VEDS requirements and the open-book database system we put in place through this choice. Given the macro analyses presented, one should not be surprised that the average hourly wage rates of 1981 community college graduates in Massachusetts were significantly above the state or, for that matter, the national average. These relatively high wage rates are readily explicable, but not from the VEDS minimally required data set, or in terms of factors that one might have attributed these fundings to if one did not have the advantage of the database we developed. Our rationale for exceeding the minimum requirements of VEDS was to put in place a system that would be capable of carrying out such analyses on a routine basis. Another reason for creating this kind of system, moreover, is that the post-secondary world is vastly different from the secondary world and macro system designers need to be aware of this basic fact.

Lastly, we believe that we have learned from the process that the open-book database concept is a strong, vibrant, dynamic, and powerful concept that will probably be a common wisdom concept by the end of the eighties.

## Bibliography

Boruch, R. Relations among methods of assuring confidentiality of social science data, Social Science Research, 1, 1972, 403-414.

Carifio, J. and Biron, R. Collecting sensitive data anonymously: further findings on the CDRGP technique. Journal of Alcohol and Drug Education, Vol: 2, No.2, Winter, 1982, 38-73.

Hellman, M.E. The mathematics of public key cryptography. Scientific American, 241, August, 1979, 138-145.

## VEDS Follow-Up Study of 1981 Community College Graduates:

### MAJOR TASKS

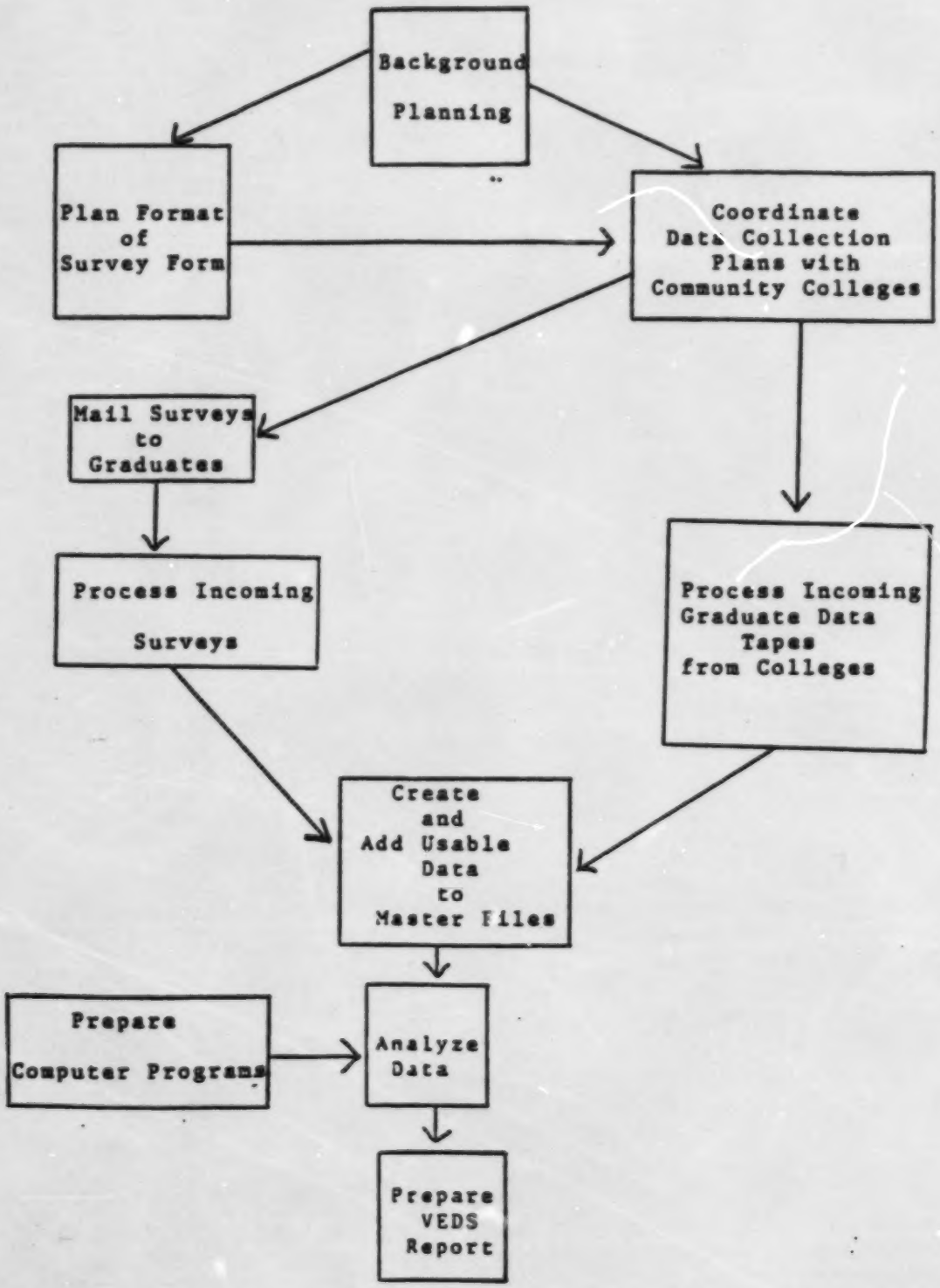
Background Planning
Plan Format of Survey Form
Coordinate Data Collection Plans with Community Colleges
Mail Surveys to Graduates
Process Incoming Surveys
Process Incoming Graduate Data Tapes from Colleges
Create and Add Usable Data to Master Files
Prepare Computer Programs
Analyze Data
Prepare VEDS Report

Figure 1

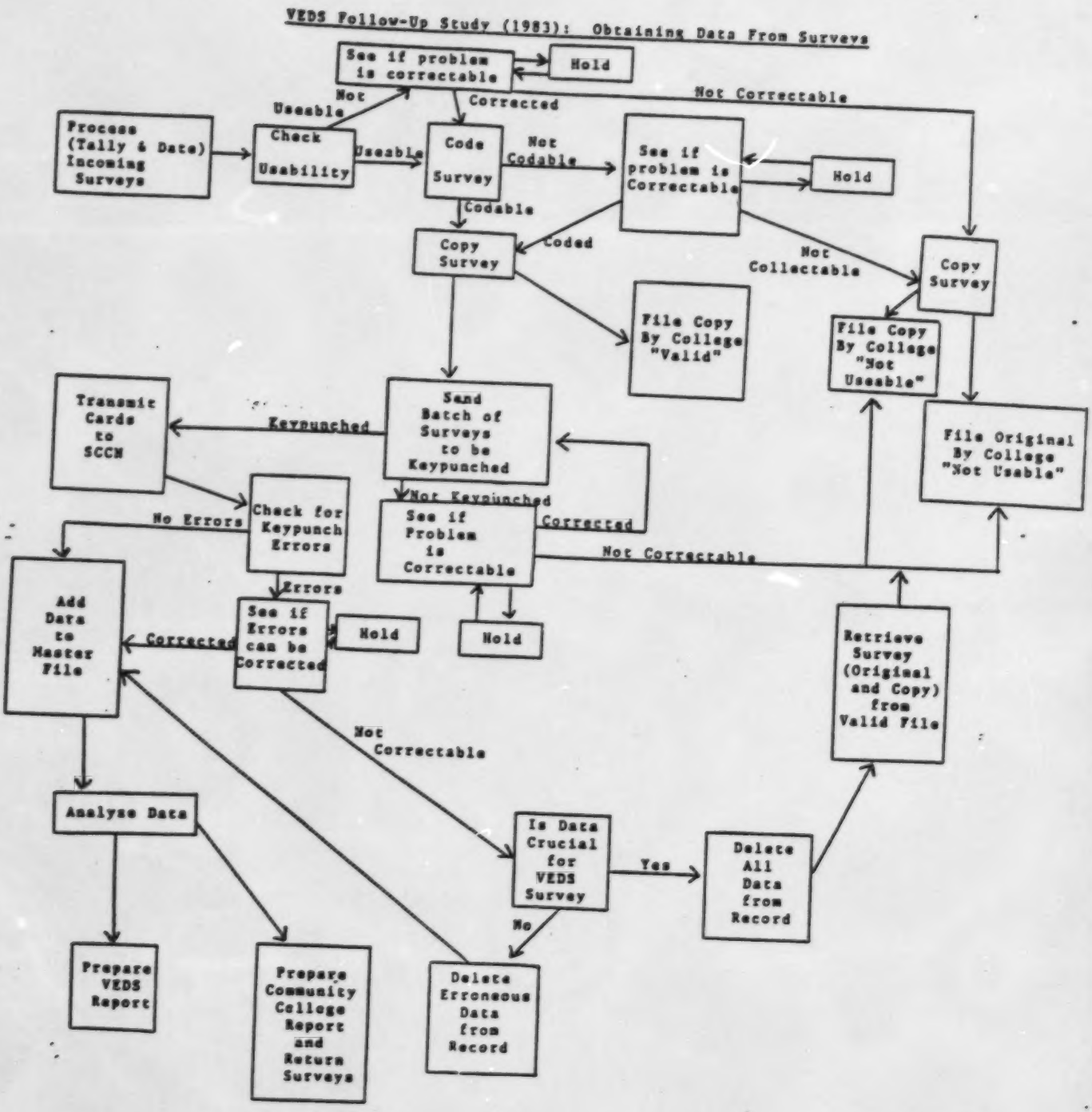
VEDS Follow-Up Study (1983): Obtaining Data From Surveys
See if problem is correctable
Hold
Not Correctable
Not Useable
Corrected
Process (Tally & Date) Incoming Surveys
Check Usability
Useable
Code Survey
Not Codable
See if problem is Correctable
Hold
Codable
Copy Survey
Coded
Not Collectable
Copy Survey
File Copy By College "Valid"
File Copy By College "Not Useable"
Transmit Cards to SCCM
Send Batch of Surveys to be Keypunched
Keypunched
File Original By College "Not Usable"
Not Keypunched
Check for Keypunch Errors
No Errors
See if Problem is Correctable
Corrected
Not Correctable
Add Data to Master File
Errors
See if Errors can be Corrected
Hold
Hold
Corrected
Retrieve Survey (Original and Copy) from Valid File
Not Correctable
Analyse Data
Is Data Crucial for VEDS Survey
Yes
Delete All Data from Record
No
Prepare VEDS Report
Prepare Community College Report and Return Surveys
Delete Erroneous Data from Record

Figure 2

STATE: MASSACHUSETTS REPORTING PERIOD: 1982

X REGIONALLY ACCREDITED
STATE APPROVED
OTHER POSTSECONDARY

POSTSECONDARY COMPLETER/LEAVER FOLLOW-UP REPORT

PART A(01): EMPLOYMENT STATUS (FOLLOW-UP) BY INSTRUCTIONAL PROGRAM (COMPLETERS ONLY)

| | | TOTAL COMPLETERS | | MILITARY SERVICE | EMPLOYED IN A FIELD PURSUING ADDITNL | | | | NOT IN LABOR | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | UNIVERSE | SAMPLE | FULL TIME | RELATED TO TRAIN | UNRELATED TO TRAIN | EDUCATION | UNEMPLOYED | FORCE | UNKNOWN |
| 01.0100 | AGRICULTURAL PRODUCTION | 10 | 10 | 0 | 5 | 0 | 0 | 0 | 0 | 5 |
| 01.0200 | AGRICULTURAL SUPPLIES/SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01.0300 | AGRICULTURAL MECHANICS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01.0400 | AGRICULTURAL PRODUCTS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01.0500 | HORTICULTURE | 21 | 21 | 0 | 4 | 1 | 1 | 1 | 1 | 13 |
| 01.0600 | RENEWABLE NATURAL RESOURCES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01.0700 | FORESTRY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01.9900 | OTHER AGRICULTURE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0100 | ADVERTISING SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0200 | APPAREL AND ACCESSORIES | 20 | 20 | 0 | 3 | 1 | 2 | 0 | 0 | 14 |
| 04.0300 | AUTOMOBILE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0400 | FINANCE AND CREDIT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0500 | FLORISTRY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0600 | FOOD DISTRIBUTION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.0700 | FOOD SERVICES | 9 | 9 | 0 | 8 | 0 | 1 | 0 | 0 | 0 |
| 04.0800 | GENERAL MERCHANDISE | 56 | 56 | 0 | 6 | 2 | 2 | 0 | 0 | 46 |
| 04.0900 | HARDWARE, BUILDING MATERIAL, ET | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1000 | HOME FURNISHINGS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1100 | HOTEL AND LODGING | 78 | 78 | 0 | 6 | 1 | 5 | 1 | 0 | 65 |
| 04.1200 | INDUSTRIAL MARKETING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1300 | INSURANCE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1500 | PERSONAL SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1700 | REAL ESTATE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.1800 | RECREATION AND TOURISM | 42 | 42 | 0 | 2 | 0 | 3 | 0 | 0 | 37 |
| 04.1900 | TRANSPORTATION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.2000 | OTHER RETAIL TRADES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04.9900 | OTHER DISTRIBUTIVE EDUCATION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07.0101 | DENTAL ASSISTING | 14 | 14 | 0 | 7 | 0 | 0 | 0 | 0 | 7 |
| 07.0102 | DENTAL HYGIENE (ASSOCIATE DEGRE | 97 | 97 | 0 | 31 | 1 | 1 | 0 | 0 | 64 |
| 07.0103 | DENTAL LABORATORY TECHNOLOGY | 10 | 10 | 0 | 2 | 0 | 0 | 1 | 0 | 7 |
| 07.0203 | MEDICAL LABORATORY ASSISTING | 68 | 68 | 0 | 11 | 0 | 1 | 0 | 0 | 56 |
| 07.0299 | OTHER MEDICAL LABORATORY TECHNO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07.0301 | NURSING (ASSOCIATE DEGREE) | 650 | 650 | 0 | 195 | 2 | 5 | 4 | 5 | 439 |
| 07.0302 | PRACTICAL (VOCATIONAL) NURSING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07.0303 | NURSING ASSISTANCE (AIDE) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Sample VEDS Report

X REGIONALLY ACCREDITED
STATE APPROVED
OTHER POSTSECONDARY

STATE MASSACHUSETTS REPORTING PERIOD 1982

POSTSECONDARY COMPLETER/LEAVER FOLLOW-UP REPORT

PART D(CONT'D): (COMPLETERS ONLY) FIELD OF EMPLOYMENT AND AVERAGE HOURLY SALARY BY INSTRUCTIONAL PROGRAM

| | SECTION I OCCUPATIONAL FIELD OF CURRENT EMPLOYMENT (CONTINUED) | | | | | | | | | | | | SECTION II AVG HOURLY SALARY* | | SECTION III BASE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TWO-DIGIT STANDARD OCCUPATIONAL CLASSIFICATION (SOC) CATEGORY | | | | | | | | | | | | | | | |
| INSTRUCTIONAL PROGRAM | 51 | 52 | 53 | 55 | 57 | 58 | 61 | 64-65 | 67 | 72 | 77 | 99 | MALE | FEMALE | MALE | FEMALE |
| 01.0100 AGRICULTURAL PRODUCTION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | 3.96 | 0 | 4 |
| 01.0200 AGRICULTURAL SUPPLIES/SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 01.0300 AGRICULTURAL MECHANICS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 01.0400 AGRICULTURAL PRODUCTS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 01.0500 HORTICULTURE | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6.97 | 7.27 | 2 | 2 |
| 01.0600 RENEWABLE NATURAL RESOURCES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 01.0700 FORESTRY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 01.9900 OTHER AGRICULTURE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0100 ADVERTISING SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0200 APPAREL AND ACCESSORIES | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | 4.50 | 0 | 1 |
| 04.0300 AUTOMOBILE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0400 FINANCE AND CREDIT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0500 FLORISTRY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0600 FOOD DISTRIBUTION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.0700 FOOD SERVICES | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6.50 | 4.83 | 4 | 3 |
| 04.0800 GENERAL MERCHANDISE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6.24 | 4.39 | 1 | 5 |
| 04.0900 HARDWARE, BUILDING MATERIAL, E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1000 HOME FURNISHINGS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1100 HOTEL AND LODGING | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6.69 | .00 | 4 | 0 |
| 04.1200 INDUSTRIAL MARKETING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1300 INSURANCE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1500 PERSONAL SERVICES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1700 REAL ESTATE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.1800 RECREATION AND TOURISM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7.50 | 6.50 | 1 | 1 |
| 04.1900 TRANSPORTATION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.2000 OTHER RETAIL TRADES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 04.9900 OTHER DISTRIBUTIVE EDUCATION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 07.0101 DENTAL ASSISTING | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | 5.44 | 0 | 6 |
| 07.0102 DENTAL HYGIENE (ASSOCIATE DEGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | 8.03 | 0 | 16 |
| 07.0103 DENTAL LABORATORY TECHNOLOGY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | .00 | 5.56 | 0 | 2 |
| 07.0203 MEDICAL LABORATORY ASSISTING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.23 | 6.75 | 2 | 8 |
| 07.0299 OTHER MEDICAL LABORATORY TECHN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 07.0301 NURSING (ASSOCIATE DEGREE) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.58 | 8.73 | 14 | 112 |
| 07.0302 PRACTICAL (VOCATIONAL) NURSING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |
| 07.0303 NURSING ASSISTANCE (AIDE) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .00 | .00 | 0 | 0 |

*IN SECTION II, ONLY INCLUDE SALARIES FOR FULL-TIME EMPLOYMENT IN A FIELD RELATED TO TRAINING.

NCES FORM 2404A-7, PAGE 12 OF 19 THIS REPORT IS AUTHORIZED BY PL 94-482 (20 USC 2391)



Sample VEDS Report

| PROGRAM | SCHOOL | EMPLOYMENT STATUS | SALARY DATA NO. | RANGE MIN | RANGE MAX | MEAN | STANDARD DEVIATION |
|---|---|---|---|---|---|---|---|
| 070103 DENTAL LABORATORY TECHNOLOGY | MIDDLESEX | FULL-TIME IN FIELD OF TRAINING | 2 | 5.50 | 5.63 | 5.56 | 0.09 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 1 | 5.68 | 5.68 | 5.68 | |
| | | ******SCHOOL TOTALS******* | 3 | 5.50 | 5.68 | 5.60 | 0.09 |
| 070103 DENTAL LABORATORY TECHNOLOGY | *ALL SCHOOLS* | FULL-TIME IN FIELD OF TRAINING | 2 | 5.50 | 5.63 | 5.56 | 0.09 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 1 | 5.68 | 5.68 | 5.68 | |
| | | *****PROGRAM TOTALS****** | 3 | 5.50 | 5.68 | 5.60 | 0.09 |
| 070203 MEDICAL LABORATORY ASSISTING | BRISTOL | FULL-TIME IN FIELD OF TRAINING | 2 | 6.00 | 7.27 | 6.63 | 0.89 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | ******SCHOOL TOTALS******* | 2 | 6.00 | 7.27 | 6.63 | 0.89 |
| 070203 MEDICAL LABORATORY ASSISTING | MASS BAY | FULL-TIME IN FIELD OF TRAINING | 1 | 8.80 | 8.80 | 8.80 | |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 1 | 7.50 | 7.50 | 7.50 | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | ******SCHOOL TOTALS******* | 2 | 7.50 | 8.80 | 8.15 | 0.91 |
| 070203 MEDICAL LABORATORY ASSISTING | MIDDLESEX | FULL-TIME IN FIELD OF TRAINING | 2 | 7.20 | 7.66 | 7.43 | 0.32 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | ******SCHOOL TOTALS******* | 2 | 7.20 | 7.66 | 7.43 | 0.32 |
| 070203 MEDICAL LABORATORY ASSISTING | NORTH SHORE | FULL-TIME IN FIELD OF TRAINING | 1 | 9.36 | 9.36 | 9.36 | |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | ******SCHOOL TOTALS******* | 1 | 9.36 | 9.36 | 9.36 | |
| 070203 MEDICAL LABORATORY ASSISTING | SPRINGFIELD | FULL-TIME IN FIELD OF TRAINING | 4 | 5.00 | 7.37 | 6.07 | 1.04 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | ******SCHOOL TOTALS******* | 4 | 5.00 | 7.37 | 6.07 | 1.04 |
| 070203 MEDICAL LABORATORY ASSISTING | *ALL SCHOOLS* | FULL-TIME IN FIELD OF TRAINING | 10 | 5.00 | 9.36 | 7.06 | 1.37 |
| | | FULL-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | PART-TIME IN FIELD OF TRAINING | 1 | 7.50 | 7.50 | 7.50 | |
| | | PART-TIME NOT IN FIELD OF TRAINING | 0 | 0.00 | 0.00 | | |
| | | *****PROGRAM TOTALS****** | 11 | 5.00 | 9.36 | 7.10 | 1.31 |